

CLAIMS

We Claim:

1. A method for mobile assisted handoff of a communication link between a mobile station and a base station in a digital cellular communications network, from a current base station to one of a number of candidate base stations within said network, said method comprising the steps of:

generating a list of a plurality of candidate channels for possible acceptance of said communication handoff;

transmitting a first measurement order from said current base station to said mobile station, said first measurement order containing said list of candidate channels;

measuring a received signal strength and a bit error rate at said mobile station for said communication between said mobile station and said current base station;

measuring received signal strength at said mobile station for each of said candidate channels listed in said first measurement order;

transmitting said received signal strength measurements from said mobile station to said current base station;

selecting a plurality of most favorable candidate channels from said received signal strength measurement results;

transmitting a second measurement order from said current base station to said mobile station, said

second measurement order containing a list of said most favorable candidate channels;

tuning and synchronizing said mobile station to each of said candidate channels listed in said second measurement order, the step of tuning and synchronizing including:

tuning into said candidate channel, reading data within time window on said candidate channel;

correlating said data from said candidate channel with a plurality of known synchronization words and identifying a most probable synchronization word within said data; and

returning back to said current base station channel;

reading and decoding an identification code for each of said candidate channels, said step of reading and decoding including:

transmitting said identification codes for each of said candidate channels from said mobile station to said current base station; and

correlating said received signal strength measurements with said identification codes to identify an optimal candidate base station for effecting said handoff of said communication.

2. The method of Claim 1 wherein said step of reading and decoding an identification code further comprises storing said data from said candidate channel into a memory device located on said mobile station.

3. The method of Claim 1 wherein said step of reading and decoding an identification code further comprises processing said data by searching for said identification code at a first predetermined number of symbols after the appearance of said probable synchronization word and, if said identification code cannot be found at said first predetermined number of symbols after said probable synchronization word, then searching for said identification code at a second predetermined number of symbols ahead of said probable synchronization word.

4. The method of Claim 1 wherein said step of reading and decoding an identification code further comprises locating said identification code within said time window on said candidate channel by known displacement from said most probable synchronization word identified within said data.

5. The method of Claim 1 wherein said digital communication channels are formatted according to IS-136 standards for digital cellular radio communication and said candidate channel received signal strength measurements and said identification code readings are made by said mobile station during idle time slots within a frame.

6. The method of Claim 1 wherein said identification code comprises a digital voice color code word in said candidate channel.

7. The method of Claim 1 further comprising the step of monitoring threshold received signal strength values for said current channel and said candidate channels after said step of transmitting said received signal strength measurements from said mobile station to said current base station, said threshold values determining when selection and activation of said handoff should occur.

8. An improved digital cellular communication system, the improvement comprising mobile station and base station elements for identifying candidate base stations for a communication handoff, making signal strength measurements on said candidate base stations, and selecting one of said candidate base stations to receive said communication handoff, said improved system comprising:

- a current base station, said current base station being in communication on a current channel with a mobile station, said current base station having a memory for storing a first list of candidate base stations, said candidate base stations being those base stations proximate to said current base station and to which said communication handoff could occur;

- a plurality of candidate base stations transmitting on a plurality of candidate channels, said transmissions containing synchronization and identification data;

- a mobile station in communication with said current base station, said mobile station comprising:

means for making received signal strength measurements on said current channel and on said candidate channels;

means for tuning to said candidate channels and returning to said current channel;

means for synchronizing to said candidate channels;

means for reading said identification data on said candidate channels including a data processing device and a memory device, said data processing device for locating and decoding said identification data on said candidate channel and said memory device for storing said identification data, said data processing device and said memory device located on said mobile station, said data processing device able to perform at least at a rate of a predetermined number of operations per measurement period and said memory device having at least a predetermined number of bits of memory;

means for correlating said received signal strength measurements with said identification data and identifying from said correlation an optimal candidate base station to receive said communication handoff.

9. The system of Claim 8 wherein said digital communication channels are formatted according to IS-136 standards for digital cellular radio communication.

10. The system of Claim 8 wherein said means for synchronizing to said candidate channels comprises a

data processing device and a memory device, said data processing device for correlating data on said candidate channel with known synchronization data and said memory device for storing said correlation and synchronization data, said data processing device and said memory device located on said mobile station.

11. The system of Claim 8 wherein said means for correlating said received signal strength measurements with said identification data comprises a data processing device, said data processing device located at said current base station.

12. An improved digital cellular communication system, the improvement comprising mobile station and base station elements for identifying candidate base stations for a communication handoff, making signal strength measurements on said candidate base stations, and selecting one of said candidate base stations to receive said communication handoff, said improved system comprising:

a current base station, said current base station being in communication on a current channel with a mobile station, said current base station having a memory for storing a first list of candidate base stations, said candidate base stations being those base stations proximate to said current base station and to which said communication handoff could occur;

a plurality of candidate base stations transmitting on a plurality of candidate channels, said

transmissions containing synchronization and identification data;

a mobile station in communication with said current base station, said mobile station comprising:

means for making received signal strength measurements on said current channel and on said candidate channels;

means for tuning to said candidate channels and returning to said current channel;

means for synchronizing to said candidate channels including a data processing device and a memory device, said data processing device for correlating data on said candidate channel with known synchronization data and said memory device for storing said correlation and synchronization data, said data processing device and said memory device located on said mobile station, said data processing device able to perform at least at a rate of a predetermined number of operations per measurement period and said memory device having at least a predetermined number of bits of memory;

means for reading said identification data on said candidate channels; and

means for correlating said received signal strength measurements with said identification data and identifying from said correlation an optimal candidate base station to receive said communication handoff.

13. The system of Claim 12 wherein said digital communication channels are formatted according to IS-136 standards for digital cellular radio communication.

14. The system of Claim 12 wherein means for reading said identification data on said candidate channels including a data processing device and a memory device, said data processing device for locating and decoding said identification data on said candidate channel and said memory device for storing said identification data, said data processing device and said memory device located on said mobile station.

15. The system of Claim 12 wherein said means for correlating said received signal strength measurements with said identification data comprises a data processing device, said data processing device located at said current base station.